

Appl. No. 10/599,539
Amdt. Dated April 9, 2010
Reply to Office Action of November 10, 2009

Attorney Docket No. 81872.0127
Customer No.: 26021

REMARKS/ARGUMENTS:

Claims 4, 15, and 16 are canceled without prejudice. Claims 1-3, 5, 6, 8-10, 13, 14, and 20 are amended. New claims 21 and 22 are added. Claims 1-3, 5, 6, 8-10, 13, 14, and 17-22 are pending in the application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. § 112:

Claim 8 stands rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Office states that the phrase “a tangent line of the trajectory” is inconsistent with the accepted meanings of tangent line and trajectory, because the tangent line of a trajectory would be the same line as the trajectory.

In response, Applicant deleted “a tangent line of the trajectory” from claim 8. Withdrawal of this rejection is thus respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. § 102:

Claims 14 and 18 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Fukawa et al. (U.S. Patent Application Publication No. 2004/0200522). Applicant respectfully traverses this rejection. Claim 14, as amended, is as follows:

A solar cell module comprising:
at least two solar cell strings, each solar cell string comprises a plurality of solar cell elements, and adjacent solar cell elements of the plurality of solar cell elements are electrically connected to each other with wiring members respectively;

a connecting member that electrically interconnects adjacent solar cell strings of the at least two of solar cell strings,

wherein the connecting member interconnects the adjacent solar cell strings with each other at a back side of the adjacent solar cell strings.

Applicant respectfully submits that Fukawa cannot anticipate or render claim 1 obvious, because Fukawa fails to teach or suggest that "the connecting member interconnects the adjacent solar cell strings with each other at a back side of the adjacent solar cell strings."

In Fukawa, a part of the connecting member (17) is arranged between the light non-receiving surface (rear surface) and back surface protective member. However, Fukawa's connecting member (17) connects a light receiving surface of one solar cell element and a light non-receiving surface of another solar cell element. The connecting member (17) does not connect adjacent solar cell strings with each other at a back side of the solar cell strings. Applicant notes that the connection member (17) of Fukawa corresponds to the wiring member (inner lead) of claim 14, and is not a connecting member as is required by claim 14.

In light of the foregoing, Applicant respectfully submits that Fukawa cannot anticipate or render claim 14 obvious, because Fukawa fails to teach or suggest each and every claim limitation. Claim 18 depends from claim 14 and therefore, cannot be anticipated by or rendered obvious over Fukawa for at least the same reasons discussed above. Withdrawal of this rejection is thus respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. § 103:

Claims 1-4 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami (U.S. Patent No. 5,380,371) in view of Hanoka et al.

(U.S. Patent No. 5,476,553). This rejection is moot with respect to claim 4 due to the cancellation of this claim. Applicant respectfully traverses this rejection as to amended claims 1-3 and 12. Claim 1, as amended, is as follows:

A solar cell element comprising:

a substrate for the solar cell element comprising a light receiving surface; and

a surface electrode on the light receiving surface;

wherein the light receiving surface comprises at least three surface bus bar electrodes, a plurality of finger electrodes connected to adjacent surface bus bar electrodes of the at least three surface bus bar electrodes,

wherein each of the at least three surface bus bar electrodes has widths of not less than 0.5 mm and not more than 2 mm, and the finger electrodes have widths of not less than 0.05 mm and not more than 0.1 mm, and

wherein the at least three surface bus bar electrodes comprise a first, a second and a third surface bus bar electrode, the second and the third surface bus bar electrodes are respectively located on both sides of the first bus bar electrode with a gap and are arranged symmetrically with each other with respect to the first surface bus bar electrode.

Applicant respectfully submits that the cited references cannot render claim 1 obvious, because the cited references fail to teach or suggest "at least three surface bus bar electrodes comprise a first, a second and a third surface bus bar electrode, the second and the third surface bus bar electrodes are respectively located on both

sides of the first bus bar electrode with a gap and are arranged symmetrically with each other with respect to the first surface bus bar electrode."

Murakami fails to teach or suggest the first surface bus bar electrode, and the second and the third bus bar electrodes which respectively located on both sides of the first bus bar electrode with a gap and arranged symmetrically. Murakami merely teaches a monolithically formed single comb-shaped surface electrode (Fig. 1C of Murakami). With such comb-shaped surface electrode, an efficiency of the solar cell element is low, because a light receiving area is small compared to the solar cell of the present invention.

Furthermore, Murakami fails to teach or suggest finger electrodes which are contacted to both adjacent surface bus bar electrodes. That is, Murakami teaches a structure wherein all the finger electrodes are connected to a single bus bar electrode (Fig. 1C of Murakami). With this structure, an efficiency of collecting carriers which are generated in a portion where the finger electrode is not disposed is low. Also, Murakami's solar cell cannot collect carriers generated near the finger electrode, if the finger electrode is broken or disconnected to the surface bus bar electrode.

Hanoka teaches a solar cell wherein two bus bar electrodes are arranged, which differs from the present invention which requires three bus bar electrodes comprising the first bus bar electrode, and the second and the third bus bar electrodes respectively located on both sides of the first bus bar electrode with a gap and arranged symmetrically with each other. Therefore, in the structure of Hanoka, the finger electrodes should be made longer than the present invention, and an efficiency of collecting carriers is lowered compared to the present invention. Furthermore, Hanoka fails to teach or suggest a width of the bus bar electrode that is wider than the finger electrode (Fig 2 of Hanoka). Thus, an electric resistance of

the bus bar electrode of Hanoka becomes higher than an electric resistance of the wide bus bar electrode required by the present invention, and results in reduction of a conversion efficiency of solar cell.

In summary, the combination of Murakami and Hanoka fails to reveal three bus bar electrodes comprising the first surface bus bar electrode, and the second and the third bus bar electrodes respectively located on both sides of the first bus bar electrode with gap and arranged symmetrically to each other, and thus the cited references cannot realize enhancement of conversion efficiency because they cannot obtain a high carrier collection efficiency in a wide light receiving surface.

In light of the foregoing, Applicant respectfully submits that the cited references cannot render claim 1 obvious, because the cited references fail to teach or suggest each and every claim limitation. Claims 2, 3, and 13 depend from claim 1 and therefore, cannot be rendered obvious for at least the same reasons as claim 1. Withdrawal of this rejection is thus respectfully requested.

Claims 5, 6, and 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murakami in view of Hanoka in further view of Fujii et al. (U.S. Patent Application Publication No. 2003/0178057). Applicant respectfully traverses this rejection.

Claims 5, 6, and 8-10 depend from claim 1 and are therefore, patentable over Murakami and Hanoka for at least the same reasons discussed above. Fujii cannot remedy the defect of Murakami and Hanoka and is not relied upon by the Office for such. Instead, the Office cites Fujii for disclosing a solar cell (Fig. 1) with a surface electrode (4) with an opposite conductivity-type diffusion layer on the surface of the semiconductor substrate having a sheet resistance of $60\Omega/\square$ - $300\Omega/\square$ that will have good electric properties [0027]; a solar cell having microscopic protrusions and recesses on the surface of the semiconductor substrate so as to introduce as much

light incident on the solar cell as possible into the semiconductor substrate, and to trap as much light introduced into the semiconductor substrate as possible within the semiconductor substrate [0007]; and the protrusions having widths and heights of 2 μ m or less [0057] and an aspect ratio of 0.1-2 [0058] in order to shorten time of manufacturing [0057], optimize the reflectance and the susceptibility to being damaged during manufacturing [0058].

In light of the foregoing, Applicant respectfully submits that the cited references cannot render claims 5, 6, and 8-10 obvious, because the cited references fail to teach or suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

Claims 15-17 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukawa. This rejection is moot with respect to claims 15 and 16 due to the cancellation of these claims. Applicant respectfully traverses this rejection as to amended claims 17 and 19. Claims 17 and 19 depend from claim 14 and are therefore, patentable over Fukawa for at least the same reasons discussed above. Withdrawal of this rejection is thus respectfully requested.

Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukawa in view of Hanoka. Applicant respectfully traverses this rejection.

Claim 20 depends from claim 14 and is therefore, patentable over Fukawa for at least the same reasons discussed above. Hanoka cannot remedy the defect of Fukawa and is not relied upon by the Office for such. Instead, the Office cites Hanoka for disclosing a solar cell module (Fig. 4-6) comprising: a translucent panel (42); a back surface protective member (50); a plurality of sheet-like solar cell elements (46) that are arranged between the translucent panel and the back surface protective member (Fig. 4-6) and electrically connected to one another (C6/L36-45); a plurality of wiring members (47) for electrically interconnecting adjacent solar cell

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elements of the plurality of the solar cell elements (C6/L36-45); and connecting one or a plurality of the solar cell modules for a greater power output (C2/L30-32)

In light of the foregoing, Applicant respectfully submits that the cited references cannot render claim 20 obvious, because the cited references fail to teach or suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

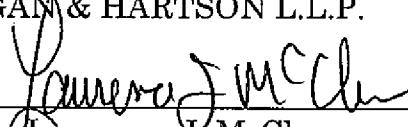
In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310)785-4600 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

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